

## CLAIMS

We claim:

1. An isolated DNA fragment comprising a  $\gamma$ -tocopherol methyltransferase coding sequence.

2. The DNA fragment of claim 1, wherein the fragment is selected from the group consisting of SEQ ID NO:1 and SEQ ID NO:3.

3. An isolated DNA fragment comprising *Arabidopsis*  $\gamma$ -tocopherol methyltransferase.

4. An isolated DNA fragment comprising *Synechocystis*  $\gamma$ -tocopherol methyltransferase.

5. A genetic construct comprising a  $\gamma$ -tocopherol methyltransferase coding sequence operably connected to a plant promoter not natively associated with the coding sequence.

6. A genetic construct as claimed in claim 5, wherein the  $\gamma$ -tocopherol methyltransferase coding sequence is selected from the group consisting of SEQ ID NO:1 and SEQ ID NO:3.

7. A transgenic plant comprising in its genome the genetic construct of claim 5.

8. The plant of claim 5, wherein the plant has an altered  $\alpha$ -tocopherol: $\gamma$ -tocopherol ratio relative to an untransformed wild-type plant.

9. The seed of the plant of claim 8.

10. The plant of claim 5, wherein the plant has an altered  $\delta$ -tocopherol: $\beta$ -tocopherol ratio relative to an untransformed wild-type plant.

11. The seed of the plant of claim 10.

12. Oil from the seed of claim 11.

13. A transgenic plant of a species in which natively  $\alpha$ -tocopherol is not the predominant tocopherol in its seeds, the transgenic plant altered to produce  $\alpha$ -tocopherol as the most abundant tocopherol in the seeds of the plant.

14. Seeds of the plant of claim 13.

15. Oil from the seeds of claim 14.

16. A transgenic plant as claimed in claim 13 wherein the transgenic plant carries in its genome a foreign genetic construction comprising a  $\gamma$ -tocopherol methyltransferase gene selected from the group consisting of SEQ ID NO:1 and SEQ ID NO:3.

17. A transgenic plant which has an altered profile of tocopherols in its seeds or oils compared to non-transgenic plants of the same species.

18. Seed of the plant of claim 17.

19. Oil from the seeds of claim 18.

20. A transgenic plant seed of a plant species in which  $\alpha$ -tocopherol is natively not the predominant tocopherol in

seeds, the transgenic plant seed containing  $\alpha$ -tocopherol as the most abundant tocopherol present in the transgenic plant seed.

21. Oil from the seed of claim 20.

22. A transgenic plant having an altered relative proportion of tocopherols in its tissues as compared to non-transgenic plants of the same species, the transgenic plant comprising in its genome an inserted  $\gamma$ -tocopherol methyltransferase coding sequence.

23. The plant of claim 22 wherein the  $\gamma$ -tocopherol methyltransferase is in the sense orientation.

24. The plant of claim 22 wherein the  $\gamma$ -tocopherol methyltransferase is in its antisense orientation.

25. A method of producing  $\alpha$ -tocopherol comprising the steps of:

(a) providing an expression host cell comprising in its genome a  $\gamma$ -tocopherol methyltransferase coding sequence operably connected to a promoter not natively associated with the sequence, wherein the promoter is functional in the host cell;

(b) culturing the host cell under conditions suitable to allow expression of the  $\gamma$ -tocopherol methyltransferase; and

(c) reacting  $\gamma$ -tocopherol and S-adenosylmethionine with the  $\gamma$ -tocopherol methyltransferase protein of step b under suitable conditions and for a period of time sufficient to allow conversion of  $\gamma$ -tocopherol to  $\alpha$ -tocopherol.